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Early scientific names of Amphibia Anura
II. An exemplary case: *Rana arborea* Linnaeus, 1758

by Alain DUBOIS & Annemarie OHLER

Abstract. — This paper provides a detailed analysis of the nomenclatural status of the scientific name *Rana arborea* Linnaeus, 1758, with identification of its primary, secondary and tertiary syntypes, discussion of the status of these specimens, and final designation of one of them (now lost) as lectotype of this nominal species. During this analysis, the status of the following other names are also discussed: *Rana hyla* Linnaeus, 1758; *Hyla* Laurenti, 1768; *Hyla ranaeformis* Laurenti, 1768; *Hyla rubra* Laurenti, 1768; *Hyla sceleton* Laurenti, 1768; *Hyla viridis* Laurenti, 1768; *Rana pentadactyla* Laurenti, 1768; *Hyla gibbosa* Lacépède, 1788; *Hyla aurantiaca* Daudin, 1802; *Rana bilineata* Shaw, 1802; *Hyla arborea* var. *meridionalis* Böttger, 1874; *Sphaenorhynchus eurhostus* Rivero, 1961. The lines of reasoning illustrated in detail in this case will be used again in further papers of this series dealing with many other early scientific names of Amphibia Anura.

Key-words. — Nomenclature, *Rana arborea* Linnaeus, 1758, *Hyla* Laurenti, 1768, lectotype designation, stabilization of name.

Noms scientifiques anciens d'amphibiens anoures
II. Un cas exemplaire : *Rana arborea* Linnaeus, 1758.

Résumé. — Cet article donne une analyse détaillée du statut nomenclatural du nom scientifique *Rana arborea* Linnaeus, 1758, avec l'identification de ses syntypes primaires, secondaires et tertiaires, la discussion du statut de ces spécimens, et finalement la désignation de l'un d'entre eux (actuellement perdu) comme lectotype de l'espèce nominale. À l'occasion de cette analyse, le statut des noms suivants est également discuté : *Rana hyla* Linnaeus, 1758 ; *Hyla* Laurenti, 1768 ; *Hyla ranaeformis* Laurenti, 1768 ; *Hyla rubra* Laurenti, 1768 ; *Hyla sceleton* Laurenti, 1768 ; *Hyla viridis* Laurenti, 1768 ; *Rana pentadactyla* Laurenti, 1768 ; *Hyla gibbosa* Lacépède, 1788 ; *Hyla aurantiaca* Daudin, 1802 ; *Rana bilineata* Shaw, 1802 ; *Hyla arborea* var. *meridionalis* Böttger, 1874 ; *Sphaenorhynchus eurhostus* Rivero, 1961. Les méthodes de travail et de raisonnement exposées de manière détaillée dans ce cas seront utilisées de nouveau dans les articles ultérieurs de cette série, qui traitera de nombreux autres noms scientifiques anciens d'amphibiens anoures.

Mots-clés. — Nomenclature, *Rana arborea* Linnaeus, 1758, *Hyla* Laurenti, 1768, désignation d'un lectotype, stabilisation du nom.

A. DUBOIS & A. OHLER, *Muséum national d'Histoire naturelle, Laboratoire des Reptiles et Amphibiens, 25 rue Cuvier, F-75231 Paris cedex 05*

INTRODUCTION

In the present series of papers, we intend to clarify and stabilize the status of a number of ancient scientific names of Amphibia Anura, many of which have already been discussed by and have posed problems to taxonomists. In the first of these papers (DUBOIS & OHLER 1996), we exposed some general principles that will help us to deal with these problems, but such

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questions always become clearer when they are illustrated by an example. The example we chose to treat in full detail here is that of the name *Rana arborea* Linnaeus, 1758. In further papers of this series, we will not give as much detailed information, as the mode of reasoning will be similar, and only factual details will differ.

The name *Rana arborea* Linnaeus, 1758 is a particularly exemplary case of the rather complicated situations with which one is sometimes confronted when dealing with very ancient scientific names. Despite several uses prior to this book, this name was first validly (in the sense of the *Code*) used in the 1758 edition of LINNAEUS's *Systema Naturae*. As usual, LINNAEUS did not state how many specimens he had before him when naming this species, but he gave a rather high number of "synonyms" of this name (*i.e.* citations of descriptions that, according to him, referred to the same species). This should not surprise us, because the *Systema Naturae* was not an original work with primary descriptions, but a catalogue, similar to modern books like FROST's (1985) checklist, where he quoted and sometimes summarized previous detailed descriptive papers. The characters LINNAEUS (1758) gave for the species *Rana arborea* were so few and so vague that they could well apply to several hundreds of tree-frog species from almost all continents: in fact, LINNAEUS's concept of the species *Rana arborea* was closer to our current concept of the family Hylidae (see *e.g.* DUELLMAN & TRUEB 1985) than to any current concept of species within amphibians. In LINNAEUS's mind, this species occurred both in Europe and in America. However, after a rather short period of uncertainty, it became clear that the European species did not occur in America, and that LINNAEUS's concept of *Rana arborea* was a composite concept applying to several distinct species. Since then, LINNAEUS's name has been consistently applied by thousands of authors to the common European tree-frog, under the name *Hyla arborea* (Linnaeus, 1758) (family Hylidae). The logical way to stabilize the status of this name would then have appeared to be through the designation among LINNAEUS's syntypes of a lectotype from Europe. However, nobody until now has dared to take such an action, clearly because all the name-bearing types of this nominal species from LINNAEUS's collection which are still known to be in existence (now in NHRM) appeared to belong to (several) American species of Hylidae (LÖNNBERG 1896; ANDERSSON 1900; DUELLMAN 1977). Faced with this situation, all authors have left this problem unsettled, and the species *Hyla arborea* still appears in checklists (*e.g.* DUELLMAN 1977; FROST 1985) as a species without name-bearing type and without type-locality.

Recently, after electrophoretic studies, NASCETTI, LANZA & BULLINI (1995) found that the populations of *Hyla* from peninsular Italy show different allozymic patterns from those of central Europe. These authors think that the Italian populations represent a species distinct from that usually called *Hyla arborea*. They suggested to us (LANZA personal communication) that this new situation made it necessary to fix the status of the latter name. Since all syntypes of *Rana arborea* still in existence are from America, they suggested that it is urgent to ask the Commission to suppress all these syntypes and to designate a neotype in agreement with the current usage of this name. We note that the same question could also have been raised when the name *Hyla arborea* var. *meridionalis* was created for the "meridional" tree-frog (BÖTTGER 1874: 66), and a fortiori when it was raised to species level on the basis of bioacoustic studies (PAILLETTE 1967; SCHNEIDER 1968), but at that time no one raised the problem. We agree that stabilization of the status of the name *Rana arborea* Linnaeus, 1758 is necessary and requires the designation of a lectotype or of a neotype and fixation of a precise type-locality, but we think that in this

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case the regular provisions of the *Code* are enough to solve this nomenclatural problem, without having to refer to the Commission. As a matter of fact, and as we already stressed it (DUBOIS & OHLER 1995a, 1996), the *Code* does not at all make it compulsory to choose a lectotype among the syntypes still available, which of course in this case would oblige us to designate as lectotype a specimen belonging to an American species.

Fig. 1 gives a complete copy of the part of the text of LINNAEUS (1758) that deals with the name *Rana arborea*. As can be seen, beside the very short and little informative diagnosis given by LINNAEUS for this species, this text contains additional information: LINNAEUS mentions seven references to descriptions or figures which, according to him, refer to the species *Rana arborea*. These references are clearly "indications" in the sense of the *Code*. We consider that all the specimens mentioned in the publications listed in this synonymy (except that preceded by ß, see below) are syntypes of *Rana arborea*, as much as the specimens which were in LINNAEUS's collections, a few of which only are known to be still in existence in the Stockholm Museum.

Before designating a lectotype among these specimens, we will analyse in detail all the information given in the seven references listed by LINNAEUS (1758: 213), numbered R1 to R7 in the order of their appearance in LINNAEUS's text. This will allow us to build a list of (at least) sixteen identified specimens, numbered S1 to S16 in chronological order of their descriptions, which, even if most of them are not yet in existence today, can be considered syntypes of *Rana arborea*, and among which we can choose a lectotype.

ABBREVIATIONS

MNHN	Muséum national d'Histoire naturelle, Paris, France
NHRM	Naturhistoriska Rijkmuseet, Stockholm, Sweden
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands

COMMENTED LIST OF REFERENCES CITED IN THE SYNONYMY OF THE ORIGINAL DESCRIPTION OF *Rana arborea* Linnaeus, 1758

R1. "*Amoen. acad.* 1. *p.* 135. Rana pedibus fissis; unguibus subrotundis, corpore laevi: postice angustato."

This citation refers to the description of the species numbered 20 in HAST's thesis (1745: 29), as reprinted in the volume 1 of the *Amoenitates Academicae* (LINNAEUS 1749: 135). This description was based on a specimen from the "Donatio Caroli Gyllenborg", about which we give more information below under number S10. This specimen, which belongs to an American species of tree-frog, is a secondary (or possibly primary) syntype of *Rana arborea* Linnaeus, 1758.

This species described by HAST (1745: 29) under number 20 was the only one referred by him to the genus *Rana* among the specimens of the GYLLENBORG collection. In the original edition of his thesis, HAST (1745: 29) included in the synonymy of this species two frogs from SEBA's (1734, 1735) books, *i.e.* S3 and S6 below, and one from the Saint Petersburg Museum,

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Hyla. 15. R. dorſo angulato tranſverſe gibbo, abdomine faſcia replicata inguinali intercepto.
Geſn. piſc. 809. Rana gibboſa 4. 5.
Habitat in Europa.
Sonus campanarum boatum e longinquo imitatur.

arborea. 16. R. corpore lævi: ſubtus punctis contiguis tuberculato, pedibus fiſſis, unguibus orbiculato-dilatatis.
Amœn. acad. 1. *p.* 135. Rana pedibus fiſſis; unguibus ſubrotundis, corpore lævi: poſtice anguſtato.
Muſ. Ad. Fr. 1. *p.* 47. Rana eadem.
Gron. muſ. 2. *p.* 84. *n.* 63. Rana.
Seb. muſ. 1. *t.* 73. *f.* 3. Rana braſilienſis gracilis.
Seb. muſ. 2. *t.* 78. *f.* 5. Rana americana rubra.
Geſn. piſc. 808. Ranunculus viridis.
β *Amœn. acad.* 1. *p.* 285. Rana pedibus fiſſis, palmis tetradactylis, plantis pentadactylis: geniculis ſubtus tuberoſis.
Habitat ſub foliis arborum Europæ, Americæ, *Muſcas in fauces revocans.*

boans. 17. R. corpore lævi: ſubtus punctis contiguis, pedibus palmatis: plantis pentadactylis, palmis tetradactylis, unguibus orbiculato-dilatatis.
Amœn. acad. 1. *p.* 285. Rana palmis tetradactylis, plantis pentadactylis palmatis, digitorum apicibus ſubrotundis.
Muſ. Ad. Fr. 1. *p.* 47. Rana eadem.
Seb. muſ. 1. *t.* 71. *f.* 3. 4. Rana ſurinamenſis.
Habitat in America.
Simillima R. arboreæ. ſed pedes omnes palmati & corpus album magnum. maculis etiam lacteis, modo hæc ſufficiant pro ſpecie diſtinguenda.

Ranæ aquaticæ oviparæ ſubeunt metamorphoſin.

FIG. 1. — Reproduction of page 213 of the 1758 edition of LINNAEUS's *Systema Naturae*, including the original descriptions of *Rana hyla* and *Rana arborea*. (Bibliothèque du Laboratoire des Reptiles et Amphibiens, MNHN).

Source : MNHN, Paris

i.e. S7 below. In the reprinted edition of his thesis, HAST (1749: 135) added a fourth synonym from the Saint Petersburg Museum, *i.e.* S8 below. All four synonyms can be considered also syntypes of *Rana arborea* Linnaeus, 1758. As will be shown in detail below, all four specimens belong to American tree-frogs.

R2. "*Mus. Ad. Fr.* 1. *p.* 47. Rana eadem."

This citation refers to the diagnosis of the species called *Rana arborea* in LINNAEUS's (1754) book. Three American specimens (S13-15) are known to correspond to this reference (see below). Three synonyms are mentioned under this name: the description of HAST (1749: 135) just discussed above, based on the specimen S10, and the two species of SEBA's (1734, 1735) frogs quoted in its synonymy, *i.e.* the specimens S3 and S6 below.

R3. "*Gron. mus.* 2. *p.* 84. *n.* 63. Rana."

This citation refers to the description of the species numbered 63 in GRONOVIUS's (1756) book. This specimen is discussed below under S16. This frog species is said to inhabit Suriname. Five names are included in the synonymy of this species: HAST's (1745, 1749) species discussed above, *i.e.* specimen S10, and the two SEBA's (1734, 1735) species included in its synonymy, *i.e.* S3 and S6; CATESBY's (1743) description of "*Rana viridis arborea*", a species from Northern America (S9); and a third species of SEBA (1735) from Lemnos (S5).

R4. "*Seb. mus.* 1. *t.* 73. *f.* 3. Rana brasiliensis gracilis."

This citation is a direct reference to SEBA's (1734) species "*Rana brasiliensis gracilis*", about which more information is given below under S3.

R5. "*Seb. mus.* 2. *t.* 78. *f.* 5. Rana americana rubra."

This citation is a direct reference to SEBA's (1735) species "*Ranula americana rubra*", about which more information is given below under S6.

R6. "*Gesn. pisc.* 808. Ranunculus viridis."

Conrad GESSNER (or Conradus GESNERUS; see ADLER 1989: 8) wrote several books, which furthermore had several editions, but LINNAEUS's reference to the name "*Ranunculus viridis*" in a page 808 suggests that the edition he had in his hands when he wrote his 1758 book was the second or the third edition of the liber IV of the *Historia Animalium*, subtitled *De Piscium et Aquatilium Animantium Natura* (GESNERUS 1604, 1620; contrary to the statement by ADLER 1989: 7, the 1620 edition of this book is the third, not the second). Three "species" of frogs are dealt with in page 808 of this book, but LINNAEUS's reference is clearly to the first one, "*Calamite*", for which GESNERUS mentions two other names ("synonyms"): "*Muta*" of PLINIUS, and "*Ranunculus viridis*" of his own book *De Quadrupedibus Oviparis* (GESNERUS 1554, reprinted 1586 and 1617). This paragraph in page 808 of GESNERUS's (1604, 1620) book contains two different pieces of information, which we regard as evidence of reference to two distinct specimens (at least): 1, a Latin text about this frog: this text is exactly copied from RONDELETIUS's (1555: 224) text entitled "De *Calamite*", which must be assumed to have been based on at least one specimen (S1); 2, a figure which is an exact reproduction of the figure of "*Ranunculus viridis*" that appears in GESNERUS (1554: 55, 1586: 60, 1617: 60), and which we regard as based on a distinct specimen (S2). Both specimens S1 and S2 are secondary syntypes of *Rana arborea* Linnaeus, 1758.

Source : MNHN, Paris

R7. "ß *Amoen. acad.* 1. *p.* 285. Rana pedibus fissis, palmis tetradactylis, plantis pentadactylis: geniculis subtus tuberosis."

This citation refers to the description of the species numbered 9 in BALK's (1746: 8) thesis, as reprinted in the volume 1 of the *Amoenitates Academicae* (LINNAEUS 1749: 285-286). This description was based on two specimens from the "Donatio Adolphi Friderici", about which we give more information below under numbers S11-12. However, it is important to stress that these two specimens *cannot* be considered syntypes of the nominal species *Rana arborea*, according to Article 72(b)(i) of the *Code* (see DUBOIS & OHLER 1996): the presence of the Greek letter ß before the reference clearly shows that LINNAEUS considered that these specimens represented a "distinct variant", which excludes these specimens from the type-series.

Finally, in the text concerning this species, BALK (1746, 1749) also refers to another SEBA's (1734) specimen, discussed in more detail below under S4: of course, this specimen also is excluded by the letter ß from the syntypes of *Rana arborea*.

COMMENTED LIST OF IDENTIFIED SYNTYPES OF *Rana arborea* Linnaeus, 1758

S1. Specimen(s) referred to in p. 224 of RONDELETIUS (1555) as "*Calamite*". Origin: region of Montpellier, Hérault, Languedoc, France. Secondary syntype(s) of *Rana arborea* Linnaeus, 1758.

RONDELETIUS's (1555) "description" does not refer precisely to particular specimens. It was composed in part of information taken from the works of PLINIUS and NICANDER, but this frog was apparently also known personally to the author, who mentioned several of its medicinal properties and who wrote: "*Ranette* nostri nominant" (RONDELETIUS 1555: 224); "Nous l'appellons en Languedoc Rainette" (RONDELET 1558: 167). Since Guilaume (sic) RONDELET (or Gulielmus RONDELETIUS) was professor at the Montpellier University (as printed on the front pages of his books), it is logical to consider that his text was in part based on specimen(s) from Montpellier's region (Southern France). However, it would be very ill-inspired to designate formally as (lost) lectotype of *Rana arborea* one of these specimens, since the only tree-frog that lives in this region is the species currently known as *Hyla meridionalis* Böttger, 1874 (see *e.g.* ARNOLD & BURTON 1978; PARENT 1981; CASTANET & GUYÉTANT 1989), a name that deserves protection since it has already been used in a high number of general publications for many years and by many distinct authors.

S2. Specimen shown in figure of p. 55 of GESNERUS (1554), and reproduced in GESNERUS (1558: 950; 1586: 60; 1604: 808; 1617: 60; 1620: 808), as "*Ranunculus viridis*". Origin: region of Zürich, Switzerland. Secondary syntype of *Rana arborea* Linnaeus, 1758.

This figure (reproduced here in Fig. 2A) shows a specimen of frog on a tree leaf (indicating an arboreal mode of life). The drawing was apparently made from a living specimen (in contrast, some other drawings in the same book are easily recognizable as made from dead collection specimens). It is of a rather poor quality, however it shows a character, the presence of a spot

Source : MNHN, Paris

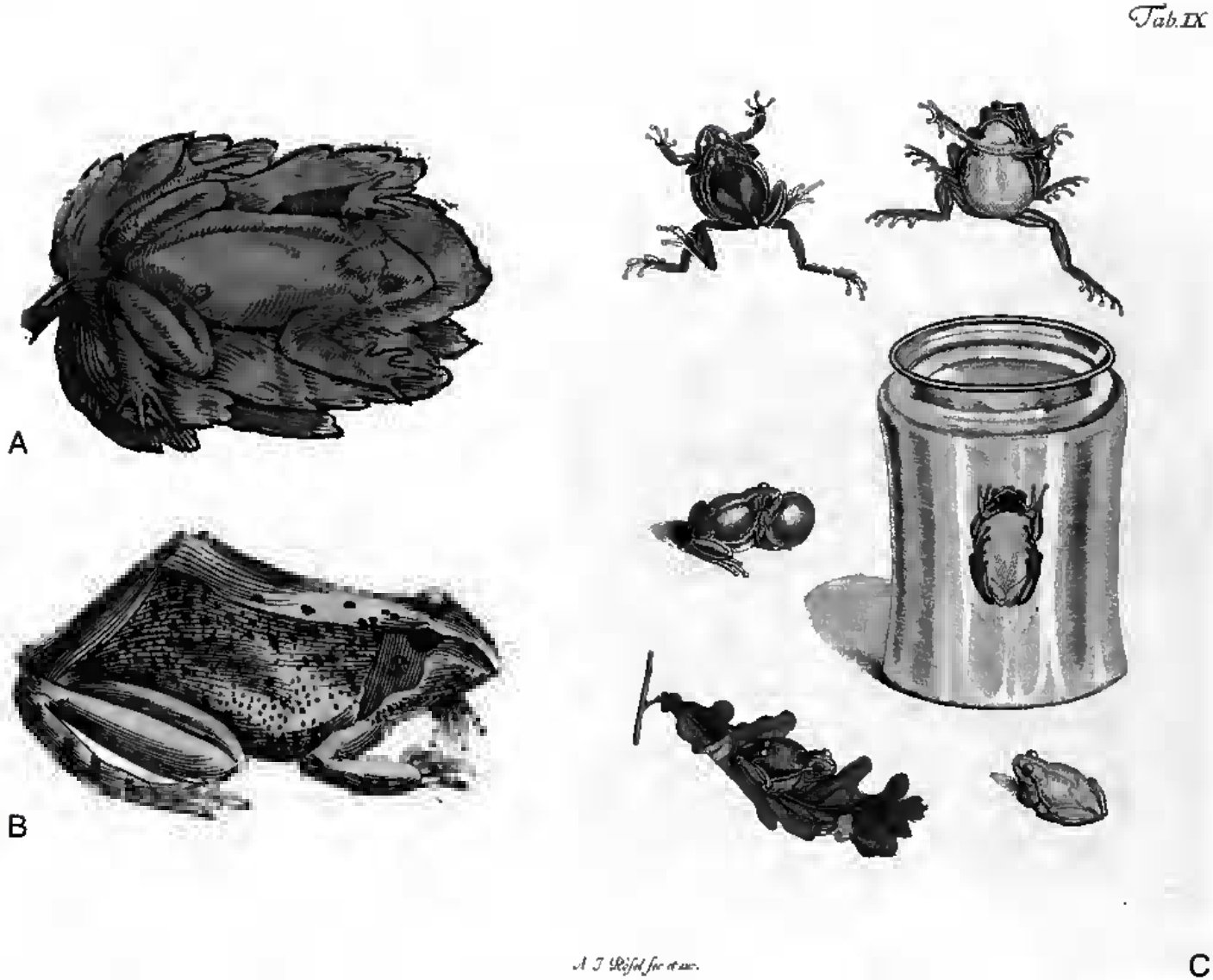

FIG. 2. — A, reproduction of figure in page 55 of GESNERUS's (1554) *De Quadrupedibus Oviparis*, showing the frog species "*Ranunculus viridis*". (Bibliothèque Centrale, MNHN). B, reproduction of figure in page 63 of GESNERUS's (1554) *De Quadrupedibus Oviparis*, showing the frog species "*Rana gibbosa*". (Bibliothèque Centrale, MNHN). C, reproduction of plate IX of ROESEL VON ROSENHOF's (1758) *Historia Naturalis Ranarum Nostratium*, showing the frog species "*Rana arborea*". (Bibliothèque Centrale, MNHN).

Source : MNHN, Paris

near the groin, that can be interpreted as the end of the dark lateral stripe on the flank of the species *Hyla arborea*, which allows its distinction from the closely related species *Hyla meridionalis* (see *e.g.* ARNOLD & BURTON 1978: pl. 9; MATZ & WEBER 1983: pl. IX; DIESENER & REICHHOLF 1986: 76-79; GÜNTHER 1986: 154-157). In the front page of GESNERUS's (1558) volume, it is expressly stated that the drawings in this work are new, *i.e.* that they were made especially for these books. According to PETIT (1965: 203), most of the drawings in these books were done by GESSNER himself, others by other Zürich's artists. As, at the time of writing this book, GESSNER was living in Zürich (see *e.g.* SALZMANN 1965; ADLER 1989), we can assume that this drawing was made from a specimen of tree-frog collected in the region of Zürich. Since the drawing was apparently made from a live specimen, since it shows a character that fits with *Hyla arborea*, and since the latter is the only species of tree-frog known to occur in Zürich's region (see *e.g.* GROSSENBACHER 1988), the specimen which was used to prepare this figure, although now lost, is a good candidate for the designation as lectotype of *Rana arborea* Linnaeus, 1758.

S3. Specimen shown in fig. 3 of pl. LXXIII and described in p. 117 of SEBA (1734) as "*Rana, Brasiliensis, gracilis*". Origin: Brazil. Secondary syntype of *Rana arborea* Linnaeus, 1758.

This figure and description were used as the basis of the name *Hyla sceleton* by LAURENTI (1768: 35), and SEBA's figure was reproduced by BONNATERRE (1789: pl. 7, fig. 4). To the best of our knowledge, this name has never been allocated to any biological species, although it seems clear to us that the drawing and short description could well be applied to one (or several) Brazilian species of hylids. The specimen shown in fig. 3 of pl. LXXIII of SEBA (1734), being the only specimen on which *Hyla sceleton* Laurenti, 1768 was based, is the holotype of this species. This specimen was still in the collections of the Paris Museum at the beginning of the 19th century (DAUDIN 1802: 28, 1803: 58), but has disappeared from these collections since then (GUIBÉ 1950; personal observation). We suggest that designation of a neotype from Brazil, that would fit with the characters given by SEBA (1734), would allow the status of this name to be fixed.

Despite the numerous discussions already devoted to the name *Hyla aurantiaca* Daudin, 1802 (see *e.g.* RIVERO 1969; DUELLMAN & LYNCH 1981; LYNCH & DUELLMAN 1984), all authors until now have ignored the fact that this name, which is a junior homonym of *Hyla aurantiaca* Laurenti, 1768, is nothing but a strict replacement name for *Hyla sceleton* Laurenti, 1768. In both his texts referring to this species, DAUDIN (1802: 28, 1803: 58) stated in full words that he changed the name of this species because of its inadequacy, and that he *only with doubt* referred to this species a second specimen in the collections of the Paris Museum. Therefore, both nominal species *Hyla sceleton* Laurenti, 1768 and *Hyla aurantiaca* Daudin, 1802 have the same holotype, the specimen shown in SEBA's figure mentioned above. The second specimen mentioned by DAUDIN (1802, 1803) is still in the Paris Museum collections, under the number MNHN 4871, but contrary to the statement of GUIBÉ (1950: 18), followed by RIVERO (1969: 701), DUELLMAN & LYNCH (1981: 238) and LYNCH & DUELLMAN (1984: 122), it is not the holotype of *Hyla aurantiaca* Daudin, 1802. Therefore, RIVERO's (1969) proposal of the "new name" (*nomen novum*) *Sphaenorhynchus eurhostus* for *Hyla aurantiaca* Daudin, 1802 (preoc-

Source : MNHN, Paris

cupied) is incorrect, because, strictly speaking, being a new name for *Hyla aurantiaca* Daudin, 1802, and hence an objective synonym of it, this name is also a new name for and an objective synonym of the name *Hyla sceleton* Laurenti, 1768. FROST (1985: 175) decided to follow the suggestion of DUELLMAN & LYNCH (1981) and LYNCH & DUELLMAN (1984) to apply the name *Sphaenorhynchus lacteus* (Daudin, 1800b) (not "1802" or "1803", as written by mistake in the above quoted works) to the species which RIVERO (1969) meant to designate under the name *Sphaenorhynchus eurhostus*. Let us note however that, to be valid, this action will have to be confirmed by a vote of the International Commission on Zoological Nomenclature. We will come back to the problems raised by these names in a forthcoming paper of this series.

WAGLER (1833: 890) referred the specimen S3 in SEBA (1734) to the species "*Discodactylus ruber* mihi". Despite appearances, this is not a new name for this species, but only a new combination (hence the term "mihi") of the specific name *Hyla rubra* Laurenti, 1768 with the new generic name *Discodactylus*, proposed in the same paper by WAGLER (1833: 888) as a *nomen novum* for the generic name *Hyla* Laurenti, 1768 (this objective synonym of *Hyla* was overlooked by DUELLMAN 1977: 24).

In conclusion, the specimen S3, a frog from Brazil, is the holotype of the following three nominal species: *Hyla sceleton* Laurenti, 1768; *Hyla aurantiaca* Daudin, 1802 (nec *Hyla aurantiaca* Laurenti, 1768); and *Sphaenorhynchus eurhostus* Rivero, 1961. It cannot be chosen as lectotype of *Rana arborea* Linnaeus, 1758 if stability of the use of this name is to be maintained.

S4. Specimen shown in fig. 1 of pl. LXXV and described in p. 119 of SEBA (1734) as "*Rana, maxima, Virginiana, eximia, rara; foemina*". Origin: "Pennsylvania", no doubt in error (see HEYER 1979: 13); emended to "Indiis" by LAURENTI (1768: 32). Specimen expressly excluded (as variety ß) from the syntypes of *Rana arborea* by LINNAEUS (1758).

This specimen was the one on which was based the name *Rana pentadactyla* Laurenti, 1768. The second specimen, stated by Laurenti (1768: 32) to be kept in the "Museo Illustrissimi Comitis Turriani", was expressly excluded from the name-bearing types of the latter nominal species, according to Article 72(b)(i) of the *Code*, by its clear inclusion in a "var. ß". It is therefore in error that HEYER (1979: 13) considered both specimens as syntypes of this nominal species, but fortunately this author treated the specimen illustrated by SEBA (1734) as "name bearer", i.e. lectotype, of *Rana pentadactyla*, so that the nomenclatural status of the name remains unchanged. MÜLLER (1927: 277) restricted the type-locality of this species to "Surinam", but, as this action was not accompanied by a neotype designation, it is not valid. HEYER (1979: 13) ignored MÜLLER's designation and refrained from restricting the type-locality, as this action "would involve arbitrary decisions". However, it is clear that final stabilization of the status of this name will require such a restriction, which can be validly obtained only through the designation of a neotype from a known population. In order not to upset MULLER's (1927) action, we suggest it would be better to choose a neotype from Suriname. Pending such a designation, SEBA's specimen, now lost, remains the holotype of the species *Rana pentadactyla* Laurenti, 1768. As mentioned above, according to Article 72(b)(i) of the *Code*, this specimen cannot be considered syntype of *Rana arborea* Linnaeus, 1758.

Source : MNHN, Paris

S5. Specimen shown in fig. 2 of pl. XIII and described in p. 16 of SEBA (1735) as "*Rana lemnia*". Origin: Limnos, Greece. Tertiary syntype of *Rana arborea* Linnaeus, 1758.

This specimen is the holotype of the nominal species *Hyla ranaeformis* Laurenti, 1768 (original description shown here in Fig. 3) and *Hyla gibbosa* Lacépède, 1788, and SEBA's figure was reproduced under the latter name by BONNATERRE (1789: pl. 5, fig. 1). We discussed elsewhere (DUBOIS & OHLER 1995b) the status of these two objective synonyms, which we think apply to a European green frog of the subgenus *Rana (Pelophylax)*. This subgenus has a very com-

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crura poſtica longiſſima : hinc ſaltus ingens ; digiti ſcandentes apicibus in arbicula viſcida plana, inſtar oris hirudinis dilatabilibus. CATESBY. 2. pag. 71. *hinc ſedet ſub folio, digitis adhærens, nec ſupra incumbens.*

XXV. Hyla ranæformis. *Seba II.* 13. 2.

DIAGN.
Capite rotundo plano ; oculis prominentibus ; pedibus faſciatis ; lateribus ſaturatius tinctis ; dorſo diſtinctiſſimo gibbo.

Var. β. (*Seba II.* 70. 4.) ſuperne maculis aſperſa.

Habitat prior in Lemno. β. Surinami.

XXVI. Hyla viridis. *Roeſel. Tab. IX. X. XI. & frontiſpic.*

DIAGN.
Supra virens, infra albens, utroque latere linea flava.

Var. β. (CATESBY *Carol.* 2. 71.) corpore tereti, linea utrinque flava, ſed recta ; diſtinguitur clamore tſchit, tſchit, tſchit, dum noſtra clamat ra, ra, ra.

C Ha-

eris poſtea inſtitutis, ut continuo clamaretur hyla! hyla! hyla! quaſi ad eundem repetendum ; ad cujus imitationem dixit VIRGILIUS:

Ut liteus hyla hyla omne ſonaret.
Ecl. VI. 44.

Quam ob rem hæc quaſi Hylæ filiorum nomen ejusdem meruit eſt.

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Habitat prior in Europæ arboribus ; β in America.

XXVII. Hyla fuſca.

DIAGN.
Corpore fuſco, pedibus ſubtus ad talos, & ad ſingulos digitorum articulos tuberoſo-laciniatis.

Hoſpitatur in Muſeo Academico Upſalienſi, & Viennæ in Turriano theſauro.

XXVIII. Hyla lactea.

DIAGN.
Corpore niveo, maculis lacteis, femoribus, tibiisque ſublividis ; hypochondriis obſolete cinereo-faſciatis ; ore ampliſſimo.

Var. β. coloris ſupra cæruleſcentis ſubplumbei.

Habitat prior in America ; hoſpitatur in muſeo Academico Upſalienſi. β in muſeo Petropolitano.

XXIX. Hyla viridi-fuſca. *Merian Surinam. Tab.* 56.

DIAGN.
Corpore fuſco, maculis viridibus emarginatis ; pedibus viridi-faſciatis ; collo utrinque ſacco conico viridi oceliato.

Habitat Surinami.

XXX. Hyla tibiatrix. *Seba I.* 71. *Fig.* 1. & 2.

DIAGN.

FIG 3. — Reproduction of pages 33 and 34 of LAURENTI's (1768) *Specimen Medicum*, including the original descriptions of *Hyla ranaeformis* and *Hyla viridis*. (Bibliothèque du Laboratoire des Reptiles et Amphibiens, MNHN)

Source : MNHN, Paris

plicated taxonomy and nomenclature (see DUBOIS & OHLER 1995a) and we refrain from discussing further the status of this name here. At any rate, it is clear that this specimen cannot be chosen as lectotype of *Rana arborea* Linnaeus, 1758.

S6. Specimen shown in fig. 5 of pl. LXVIII (not LXXVIII, as printed by error in LINNAEUS, 1758: 213) and described in p. 70 of SEBA (1735) as "*Ranula, Americana, rubra*". Origin: America. Secondary syntype of *Rana arborea* Linnaeus, 1758.

This figure and description were used as the basis of the name *Hyla rubra* by LAURENTI (1768: 35). The same name was used again, with reference to the same figure in SEBA, by many ancient authors, including LACÉPÈDE (1788: 327, 459), BONNATERRE (1789: 10), DAUBENTON (1782: 668), DAUDIN (1800a: 11; 1802: 26; 1803: 53) and DAUDIN in SONNINI & LATREILLE (1801: 176). According to DAUDIN (1800a: 11; 1802: 27; 1803: 54), the specimen shown in figs 1-2 of pl. VI of DAUDIN (1800a), in fig. 1 of the plate facing p. 176 of SONNINI & LATREILLE (1801), and in figs 1-2 of pl. IX of DAUDIN (1802) was kept in the Paris Museum collections, and originated from SEBA's collection; however, DUMÉRIL & BIBRON (1841: 595) stated that this specimen did not come from SEBA's collection, so that it cannot be the specimen shown in fig. 5 of pl. LXVIII of SEBA (1735). Despite this discrepancy, it is clear that DAUDIN did not propose a new name, but simply used LAURENTI's name *Hyla rubra*, even if he did not expressly quote the latter, as was often the case in his time (see the detailed discussion of this case in DUBOIS & OHLER 1996). Therefore we disagree with DUELLMAN & WIENS (1993) who recognized a nominal species *Hyla rubra* Daudin, 1802, distinct from *Hyla rubra* Laurenti, 1768.

The holotype of *Hyla rubra* Laurenti, 1768, from SEBA's collection, is not in the Paris Museum collections (DUMÉRIL & BIBRON 1841; GUIBÉ 1950; personal observation) and must be considered lost. Therefore, DUELLMAN & WIENS's (1993) designation of a neotype (RMNH 25883, from Paramaribo, Suriname) for this species is valid, and stabilizes the status of this name.

Given all this information, the specimen S6 would of course be a very bad choice for the designation of a lectotype for *Rana arborea* Linnaeus, 1758.

S7. Specimen from the Saint Petersburg collection described under Nr. 47 in p. 427 of ANONYMOUS (1742) as "*Rana surinamensis prone coerulescentis supine albi coloris, ad latera utrimque maculis nigris notata cum foetibus exclusis Pipae*". Origin: Suriname. Tertiary syntype(s) of *Rana arborea* Linnaeus, 1758.

We are not aware of any publication that would elucidate the status of the specimen, kept in alcohol, on which was based the above reference, but since this frog is said to be from Suriname, this specimen would not appear to be a good candidate for designation of a lectotype for *Rana arborea* Linnaeus, 1758.

Source : MNHN, Paris

S8. Specimen from the Saint Petersburg collection described under Nr. 55 in p. 428 of ANONYMOUS (1742) as "*Rana americana parva ventre albido; dorso plumbei coloris, lateribus ex albo et nigro varietatis*". Origin: America. Tertiary syntype(s) of *Rana arborea* Linnaeus, 1758.

The case of this name is similar to the preceding one. As this specimen is said to be from America, it would not be a reasonable choice for lectotype designation for *Rana arborea* Linnaeus, 1758.

S9. Specimens shown in pl. 71 and described in p. 71 of CATESBY (1743) as "*Rana viridis arborea*". Origin: "Virginia and Carolina", U.S.A. Tertiary syntypes of *Rana arborea* Linnaeus, 1758.

These specimens (one shown on the plate, additional ones suggested by the text), which belong to a North American tree-frog, were the basis of "var. ß" of LAURENTI's (1768) *Hyla viridis*. HOLBROOK (1842: 121-122) restricted the use of the latter name to CATESBY's (1743) species, and so doing he "almost" designated a lectotype, but this action was incorrect because, according to Article 72(b)(i) of the *Code*, mention of "var. ß" excludes these specimens from the syntypes. The same specimens were later the basis of the description by SHAW (1802: 136) of *Rana bilineata*, of which they are therefore the syntypes. According to DUELLMAN (1977: 46), they belong to the species currently known as *Hyla cinerea* (Schneider, 1799), which inhabits the southeastern U.S.A. Therefore these specimens would be a very bad choice for lectotype designation for *Rana arborea* Linnaeus, 1758.

S10. Specimen from the "Donatio Caroli Gyllenborg" described under Nr. 20 in p. 29 of HAST (1745) and in pp. 135-136 of HAST (1749) as "*Rana pedibus fissis, unguibus subrotundis, corpore laevi, pone angustato*". Origin: unknown. Secondary (or possibly primary) syntype of *Rana arborea* Linnaeus, 1758.

According to LÖNNBERG (1896: 11), a single specimen is kept in the LINNAEUS collection (now in NHRM) with the label "*Rana arborea*, Mus. Gyllenb.", but this specimen, which apparently belongs to the American species *Hyla leucophyllata* Beireis, 1783, was probably not part of the original GYLLENBORG collection described by HAST (1745, 1749). The identity of the original specimen(s) described by HAST (1745, 1749) remains therefore in doubt, but, since this author listed only American species in the synonymy of this species, it seems appropriate to admit that the latter was probably an American species. This specimen also would therefore be a very bad choice for the lectotype of *Rana arborea* Linnaeus, 1758.

S11-12. Specimens from the "Donatio Adolphi Friderici" described under Nr. 9 in pp. 8-9 of BALK (1746) and in pp. 285-286 of BALK (1749) as "*Rana pedibus fissis, palmis tetradactylis, plantis pentadactylis; geniculis subtus tuberosis*". Origin: unknown. Specimens expressly excluded (as variety ß) from the syntypes of *Rana arborea* by LINNAEUS (1758).

Source : MNHN, Paris

According to LÖNNBERG (1896: 13), two specimens from the "Donatio Adolphi Friderici" were kept in the LINNAEUS collection (now in NHRM). LÖNNBERG (1896: 13) writes: "The two discoloured specimens can hardly with certainty be classified, but certainly they do not belong to the *Hyla arborea* of recent authors. I think, it is some American species with better developed vomerine teeth." DUELLMAN (1977: 31) did not mention these two specimens in his discussion of the Linnaean syntypes of *Rana arborea* still in existence. As a matter of fact, as mentioned above, these two specimens cannot be candidates for the lectotype designation of *Rana arborea* Linnaeus, 1758 because, according to article 72(b)(i) of the *Code*, they are not to be considered syntypes of this nominal species.

S13-15. Specimens from the "Museum Drottningholmense" collection referred to in p. 47 of LINNAEUS (1754) as "*Rana arborea*". Origin: America. Primary syntypes of *Rana arborea* Linnaeus, 1758.

According to ANDERSSON (1900: 17), three specimens corresponding to this reference were kept in the LINNAEUS collection (now in NHRM). Two of these specimens were identified by ANDERSSON (1900: 17) as *Hyla punctata* (Schneider, 1799), a species from South America. DUELLMAN (1974: 10, 1977: 31, 89) further stated that these two specimens (NHRM 155) are part of the syntypes of *Calamita punctata* Schneider, 1799. The third specimen was tentatively referred by ANDERSSON (1900: 18) to the species *Hyla inframaculata* Boulenger, 1882 from Brazil, "or some other species, belonging to the same American group of the genus *Hyla*". According to DUELLMAN (1977: 31), this third specimen is not to be found now in the NHRM collection. At any rate, these three American specimens are not good candidates for the lectotype designation of *Rana arborea* Linnaeus, 1758.

S16. Specimen(s) from GRONOVIUS's "Museum Ichthyologicum" described under Nr. 63 in p. 84 of GRONOVIUS (1756) as "*Rana palmis tetradactylis fissis, plantis pentadactylis semipalmatis, unguibus digitorum subrotundis, corpore laevi, pone angustato*". Origin: Suriname. Secondary syntype(s) of *Rana arborea* Linnaeus, 1758.

We are not aware of any publication that would elucidate the status of the specimen(s) which GRONOVIUS (1756) had before him when he wrote the rather detailed description of this species, but he clearly stated that this frog was from Suriname, so that this/these specimen(s) would not appear to be good candidate(s) for designation of a lectotype for *Rana arborea* Linnaeus, 1758.

LECTOTYPE DESIGNATION FOR *Rana arborea* Linnaeus, 1758

The detailed survey above has allowed to identify at least sixteen specimens that could be considered as possible syntypes of *Rana arborea* Linnaeus, 1758. The number of sixteen is a number by default, because in some cases the exact number of specimens which had been used to prepare the original description cannot now be ascertained.

Source : MNHN, Paris

A detailed analysis of the data concerning these specimens shows that the latter can be referred to four categories, as follows.

1. Three specimens (S13-15) are primary syntypes of *Rana arborea*. All three refer to American species of Hylidae, and would therefore be very bad choices for lectotype designation for *Rana arborea*. Although two of these specimens (NHRM 155) are apparently the only original syntypes of *Rana arborea* to be still in existence, we propose to discard them as name-bearing types, in order to maintain the stability of nomenclature. Designation below of another, not primary, syntype, as lectotype makes these two specimens become paralectotypes of *Rana arborea*, *i.e.* specimens which do not play any more role for the clarification of the nomenclatural status of this name.

2. Three specimens (S7-9) are tertiary syntypes of *Rana arborea*. As we already underlined it (DUBOIS & OHLER 1996), tertiary syntypes should as much as possible be avoided for lectotype choice. In the present case, this is all the more justified that these three specimens originated from America.

3. Three specimens (S4, S11-12) were expressly excluded (as variety ß) from the syntypes of *Rana arborea* by LINNAEUS (1758) himself. Furthermore, one of these specimens (S4) clearly belonged to an American species, and the other two probably also.

4. Finally, seven specimens were identified as secondary syntypes of *Rana arborea*. Four of these specimens (S3, S6, S10, S16) can immediately be discarded for possible lectotype designation, as they originated from America. The three remaining specimens (S1, S2, S5) were of European origin. The detailed analysis presented above shows that these (at least) three specimens belonged to three distinct biological species. Specimen(s) S1 belong(s) to the species currently known as *Hyla meridionalis* Böttger, 1874. Specimen S5 belongs to a green frog of the *Rana (Pelophylax)* subgenus, not to the genus *Hyla*. The only syntype which clearly belongs to the species currently known as *Hyla arborea* Linnaeus, 1758 is the specimen S2. Although this specimen is now lost, it is clearly the best choice for lectotype designation for *Rana arborea*: this choice will allow this name to remain objectively and definitively attached to the central European tree-frog which has been called *Hyla arborea* or *Hyla arborea arborea* in thousands of publications already.

In conclusion, we hereby formally designate as lectotype of the nominal species *Rana arborea* Linnaeus, 1758 the specimen shown in the figure of page 55 of GESNERUS's (1554) book, here reproduced in Fig. 2A. In agreement with this designation, we hereby restrict the type-locality of this nominal species to: "region of Zürich (47°23'N, 8°32'E), canton of Zürich, Switzerland".

If in the future it appeared essential, in order to stabilize further the status of the name *Rana arborea* Linnaeus, 1758, to have a type-specimen to which some biological information (such as bioacoustic, biochemical or cytogenetic data) be attached, it would be possible to designate a neotype for this taxon. The only requirement that would then follow from our present action is that this specimen should have been collected in the region of Zürich. Such a work should be carried out paying attention to the conservation status of this species, which is now rare in the Zürich region (GROSSENBACHER 1988: 109-111).

Source : MNHN, Paris

STATUS OF THE NAME *Rana hyla* Linnaeus, 1758

The name *Rana hyla* Linnaeus, 1758 has been traditionally considered a synonym of *Rana arborea* Linnaeus, 1758 (see *e.g.* MERTENS & WERMUTH 1960: 49; GORHAM 1974: 94; DUELLMAN 1977: 31). Probably this synonymy was initially proposed because of the identity between LINNAEUS's (1758) specific name *hyla* and LAURENTI's (1768) generic name *Hyla*, the valid name of the genus including the European tree-frogs. However, this is incorrect.

This statement is not based on the examination of original syntypes of this nominal species, since no such syntypes are known to exist (LÖNNBERG 1896; ANDERSSON 1900; DUELLMAN 1977). The original text of LINNAEUS (1758: 213), which is here reproduced in Fig. 1, gives a short diagnosis of *Rana hyla* and refers to a single synonym for this name: "*Rana gibbosa*" in GESNERUS (1604: 809, 1620: 809). This name is in a situation similar to that of the name "*Ranunculus viridis*" discussed above under S2: here also the descriptive notes and drawing in liber IV of the *Historia Animalium* refer to the earlier description and drawing in liber II. The figure (reproduced here in Fig. 2B) is of a good quality and clearly shows an European brown frog of the group of *Rana (Rana) temporaria* Linnaeus, 1758 (see DUBOIS 1992). In the 1558, 1604 and 1620 editions of liber IV, GESNERUS did not provide a detailed description, but referred to the description of "*Rana gibbosa*" that he had published earlier in liber II (GESNERUS 1554: 58, 1586: 63, 1617: 63). The latter description also clearly fits with *Rana temporaria*. Besides, in both books, GESNERUS provided comments on the mating calls of these frogs (with a discussion about so-called "voiceless" populations), notes on their habitats, and discussions of previous authors who had already written about them. All this information is quite clear evidence that the species meant by this author under the name "*Rana gibbosa*" is our current *Rana temporaria*.

In order to definitively stabilize the status of the name *Rana hyla* Linnaeus, 1758, we hereby formally designate as lectotype of this nominal species the specimen shown in the figure of page 63 of GESNERUS's (1554) book, here reproduced in Fig. 2B. In agreement with this designation, and following the conclusions of the discussion above under S2, we hereby restrict the type-locality of this nominal species to "region of Zürich (47°23'N, 8°32'E), canton of Zürich, Switzerland".

The name *Rana hyla* Linnaeus, 1758 should therefore now be treated as a subjective synonym of *Rana temporaria* Linnaeus, 1758. The latter name is the name of the type-species of the genus *Rana* Linnaeus, 1758, and it has been used in thousands of publications by thousands of authors. It should therefore be protected. In order to avoid any possible threatening of this name, we hereby take a first reviser action and we afford priority to the name *Rana temporaria* Linnaeus, 1758 over *Rana hyla* Linnaeus, 1758.

Source : MNHN, Paris

STATUS OF THE NAME *Hyla viridis* Laurenti, 1768

The name *Hyla viridis* Laurenti, 1768 is traditionally referred to the synonymy of *Hyla arborea* (Linnaeus, 1758) (see *e.g.* MERTENS & WERMUTH 1960; GORHAM 1974; DUELLMAN 1977). This name is of particular nomenclatural importance, because, following STEJNEGER's (1907: 75) designation, it is the type-species of the nominal genus *Hyla* Laurenti, 1768 (which had been created with nine originally included species, some of which are now placed in other genera). So its assignation to a biological species must be clear and definitive, and not liable to raise problems in the future.

Fig. 3 provides a copy of the original description of the nominal species *Hyla viridis* Laurenti, 1768. It contains three parts. The first part starts with reference to plates IX, X, XI and frontispiece of ROESEL VON ROSENHOF (1758), followed by a short diagnosis; this clearly refers to the common European tree-frog, studied and figured in many details by ROESEL VON ROSENHOF (1758) under the name "*Rana arborea*". The second part concerns the "var. ß" of this species: it consists in a reference to CATESBY's (1743: 71) text, followed by descriptive notes, including notes on the calling behavior of the frog; this clearly refers to the American tree-frog discussed above under S9. Finally, the third part concerns the distribution of this frog, which is said to inhabit "first" the trees of Europe, and America for variety ß. We already pointed out above that HOLBROOK's (1842) "restriction" of the use of the name *Hyla viridis* to the American species is invalid, since mention of "var. ß" excludes CATESBY's specimens from the syntypes. Therefore the only remaining syntypes are those shown in ROESEL VON ROSENHOF's (1758) plates quoted in LAURENTI (1768: 33). All these specimens clearly belong to the species currently known as *Hyla arborea* (Linnaeus, 1758).

We hereby formally designate as lectotype of the nominal species *Hyla viridis* Laurenti, 1768 the calling male shown in middle left position in plate IX of ROESEL VON ROSENHOF (1758), here reproduced in Fig. 2C. Since ROESEL VON ROSENHOF lived and worked in Nürnberg (see *e.g.* ADLER 1989: 10), and since his text and illustrations were clearly prepared from living specimens which he must have collected close to his working place, we hereby restrict the type-locality of this nominal species to: "region of Nürnberg (49°27'N, 11°04'E), Bayern, Germany". This nominal species should currently stand as a junior subjective synonym of *Hyla arborea* (Linnaeus, 1758).

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Source : MNHN, Paris

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